Yang-Mills generalization of the geometrical collective model
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Bohr-Mottelson model is generalized and recast as a Yang-Mills theory. The gauge
symmetry determines conservation of Kelvin circulation. The circulation commutes
with the Hamiltonian when it is the sum of the kinetic energy and a potential that
depends only on deformation. The conventional Bohr-Mottelson model is the special
case of circulation zero, and wave functions are complex-valued. In the generaliza-
tion, any quantized value of the circulation is allowed, and the wave functions are
vector-valued. The Yang-Mills formulation introduces a new coupling between the
geometrical and intrinsic degrees of freedom. The coupling appears in the covariant
derivative term of the collective kinetic energy. This kind of coupling is sometimes
called "magnetic" because of the analogy with electrodynamics.

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